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MASTERS THESIS

"FENCES"

BY

George Elyjiw

Submitted in Partial Fulfillment of the
Requirements for the Degree
MASTER OF FINE ARTS

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MASTERS THESIS

"FENCES"

BY

George Elyjiw

R·I·T

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1. Preliminary Information

1.1 Background

When I started planning my thesis one of my advisors, Jack Slutzsky, made me make a list of things I was "Passionate" about. On top of this list was the friendship between man and animal; particularly between a boy and his dog. I also listed my passion for "Jumping fences," and life at the stables. I fought with many different scripts, all of which were lifeless and without passion. Then one night at the stables during a terrific storm the horse I was riding was 'spooked' by thunder and went careening over a random set of fences. Rather than be terrified, I found myself not wanting to stop the horse. The trainer was yelling all the time at me, but the rain drown out her cries to take a different course. I didn't want to hear her commands; I wanted to just ride over a random course of fences. My mind was not even truly there, for a relationship I was in had just broken, and my favorite horse, Spirit, had been 'put down.' I didn't feel like having anyone tell me which path to take, which fence to jump, which course to take. I wanted to exercise my 'free will.' Latter that evening I wrote my thoughts down in a short story, "Fences," which I latter summarized in a poem. This is that short story turned into an animation. "Fences" is about overcoming boundaries, internal and external, that we place upon ourselves and have placed upon us through our environment. Overcoming our pre-conceived notions about animation is one of the boundaries I hope to break.

1.2 Fences Poem

Fences of wood, nails
straight rails
Boundaries marked in Earth and Mind
Keep us from wandering through
untold forests

Keep us from straying
over boundaries built
long ago

1.3 Key Words and Phrases

1" Video, 16mm film, 24 Frames Per Second, 30 Frames Per Second, ADPro, Amiga, DCTV, digitize, Ektachrome, film transfer, morphing, null-modem emulator, R.G.B., real-time, rotoscope, Targa, Topas 2.4, Topas 3.1, Twin, video buffer, video field, video frame.

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2. History

2.1 Animation

Computer animation, "Traditional" animation, and most facets of what we now call "The Moving Image" have been so strongly influenced by previous 'art forms' that their potentials are seldom realized. Due to the history of animation and its close ties to character animation, 3D computer animation technology has been attempting to duplicate character animation, from the crude 3D forms of "Wally and the Bee" to the advanced baby in "Tin Toy." The 3D character animation currently capable on most systems cannot approach the realism created by traditional animators. The 3D computer animation system is a new "Moving Image" tool, a new medium, which should be approached without pre-conceived notions of animation and the traditions one associates with "Cartoons."

Animation evolved from comic strip art much like Television evolved from Radio. The first TV broadcasts often imitated radio shows; the medium of TV suffered creative constraint which was a by-product of it's evolution. Similarly, 3D computer animation has been creatively 'bogged down' by pre-conceived notions about the incorporation of traditional character animation techniques into 3D animations. Instead of realizing the potential for creating animations only the imagination can limit, 3D is being used more and more to imitate a previous art form.

The first animations were cartoons; the first animated cartoon ever is credited to James Blackton, a comic strip artist and reporter for The New York Evening World, who in 1900 made the film "Enchanted Drawing." Comic strip art, a.k.a. "Yellow Journalism," was more or less invented in the late 1880's-1890's. Joseph Pulittzer started publishing "Down in Hogan's Alley" in 1895 in the newspaper New York World. Virtually all of the early animators started out as comic strip artists. For instance, Max Fleisher, who created Betty Boop and Popeye the Sailor worked as a cartoonist for the Brooklyn Daily Eagle in 1901. He made his first cartoon in 1917, it took a year to complete, and ran less than a minute.

Windsor McCay, creator of "Little Nemo," is credited with the invention of "Cycles" for repetitive motions like walking, a technique frequently used today in traditional and in 3D animations. The first cartoon "Star" (a character with personality) was Otto Mesner's "Felix

the Cat," 1920-27. Felix was really popular, however Pat Sulivan, who owned the rights to Felix, refused to believe Felix needed sound accompaniment, which doomed Felix. Walt Disney's "Steam Boat Willie," 1928, was the first sound cartoon and launched the incredible careers of Walt Disney and the mouse which eventually ended being named "Mickey Mouse.

Walt Disney was ahead of his time again 1932 when he introduced another innovation, color, in his film "Flowers and Trees," a forerunner to Fantasia. Fantasia finally begins to show the maturation of animation; the art form of animation becoming an independent means of expression instead of talking color comics. During this period Disney created "The Legend of Sleepy Hollow," in which the chase scene between Ichabad Crane and the Headless Horseman portrays horror and humor to the viewer. "Fences" tries to draw creatively, at least in 'Spirit,' from the shadowy worlds of Ichabad Crane. "Fences," although attempting to break tradition with current 3D character tradition, is inspired in part by the way Disney was able to create believable, empathetic imaginary worlds.

3D animation is often qualitatively judged using inappropriate criteria. Where as "Aesthetic Value" is usually give for the reason an old master's painting sells for millions, "Complexity" or the latest "Morph" or "Bump Texturing" techniques are the gages that a production company uses to sell their 'art.' The commercialization of 3D animation is not wholly to blame for this new age "Kitsch;" even old Siggraph tapes will show animations created by Universities which flaunt some new effect or technique. If the old masters simply judged painting by complexity or new techniques used, their work would have been tedious and dated. Where as the "Looney Toons" shorts relied on verbal cleverness and slapstick humor, Disney relied on action, cuteness, sight-gags, and a high quality standard, many 3D animations today rely on the complexity of modeling and rendering, making them sterile and bereft of any empathetic qualities.

"Fences" attempts to use the beneficial aspects of 3D systems, such as the rendering of complex 3D perspectives without falling into the "Cartoon" category.

3. The Story

3.1 Fences

We turn the corner cantering too fast, I try to half-halt. The fence is upon us as I press my legs against the horse's sides and tuck next to his neck. Press-release, sitting back up, shoulders first, all the while looking at the next gate.

The rain on the tin roof (of the arena) is deafening and soothing, like the sound of a thousand hands clapping. It has wiped all thoughts from my mind except the next gate coming up and the pace of the canter. Together, we go over the gate, my legs closed tightly around him, my chest nearly touching his neck. Together, we take the fence. We hang in the air just long enough for me to believe we are flying.

My muscles against his is what drives both of us to the next fence; now we are flying, we are the wind again. I hear nothing but the roar of the rain and the faint yells of the trainer. She is screaming at the top of her lungs and I don't know why. I can't hear her. We are taking the fences and I feel my form has been good. "Wrong course!" She must have been yelling at me the whole time -- I've been taking the wrong course and haven't even noticed.

"Pat the horse. *He* looked great."

I guess I still have her on my mind. Andrea. I thought I blocked that part of my life out completely, yet sometimes I remember her. She first took me to the stables and showed me her horses. I will never forget being dwarfed by these magnificent beasts. Walking around a thoroughbred on cross-ties made me feel a little tense. She turned her horses out in the paddock and cracked the whip to make them run. I watched her as much as I watched the horses as she saddled up and jumped fences.

She kidded with me that when the fall came she wouldn't stick around. I knew that she was moving away. Then her world began closing in on her. She just spent more and more time with the horses. The horses where her only escape, they were the only thing that seemed to matter to her. I wondered what she saw, what she felt when she jumped fences.

Andrea, if we just hadn't kissed that night we would still be friends.

Then it was my world which came apart. Some things are beyond control. I really needed you then, Andrea, I really needed a friend. But the fall had come and you were gone. I don't know why you meant so much to me.

I went in the mornings and watched them turn the horses out. The horses were the only thing that brought me peace.

Since that time I have learned to ride and jump. It has absolutely nothing to do with Andrea anymore. I love the horses.

"Keep your mind on the course!"

We turn the corner cantering just right as I press my legs against the horses sides and tuck down close to his neck. I can only think of the horses pace and the next gate as we fly like the wind.

4. Components

4.1 Barn

The first aesthetic problem was to create a real atmosphere of a barn. The barn is modeled after the indoor polo ring at Huntington Meadow Stables. The number of support struts for the roof have been decrease, the reason being that a higher number becomes too dense for any interesting compositions to occur. In other words, it simply didn't look good. Otherwise, the model is accurate. The fences are painted in Huntington Meadows' colors, and laid in a course actually laid out at Huntington Meadows.

The barn was built first. The barn used as a model was closely studied and re-constructed as closely to scale and detail to the original. Wood grain in the wood constructing the barn was digitized from several sources in order to avoid using the same wood over and over. Wood grain was painstakingly aligned to match the correct direction in the support struts. Five different pieces of wood were originally digitized and randomly distributed to different struts to duplicate the randomness of real wood buildings; not all pieces of wood look the same. I avoided using procedural wood while building the barn to avoid the "Fake" look it often has.

A problem which latter occurred upon the upgrade from Topas 2.4 to 3.1 versions was that texture mapping was seriously *degraded* in the upgrade. Yes, it got worse, not better. This means that when you zoom in on a texture map image, you start seeing huge pixels with hardly any anti-aliasing, if any at all. The reason why it got worse with the upgrade was because the render accelerator card which worked along with Topas 2.4 was not compatible with 3.1. This card handled anti-aliasing of texture mapped images in a hardware 'fix', version 3.1 handled it in it's software. If you were to look at a close-up of some of the wood as it flies by you can see the pixels of the underlying texture map. Topas is very disappointing in this aspect of their 'upgrade.'

4.2 Forest

The forest around Huntington Meadows is not as dense, and certainly not as foreboding. However, I was not creating Huntington Meadows, but a place which only exists in my imagination, and now also in my Topas system. I wanted to create perspective by using a mass

number of trees. The only way to do this and not use up too much memory was to simplify the trees.

There are only four different tree models in the forest. Each tree consists of about eighteen branches rotated about its axis. Each branch is only a 2D polygon to avoid using up too much memory. The trees are rendered as black with no surface reflectance to hide their true semi-flat nature. Each branch has an attached trunk, so the trunk of the tree exists even if one branch is used to create a tree. The trees are randomly rotated about their "Y" and "Z" axis to give them individuality. They also have a random number of branches deleted off of them for the same purpose. They are placed randomly in a plane to duplicate nature's randomness.

4.3 Rotoscope

The rotoscope sequence was created in order to represent what is going on in the mind of the horse's rider. The rotoscope sequence contrasts the coldness of the 3D barn and forest. It represents life in a dead sea of trees; it shows what came before the cold rainy fall came and took both "Andrea" and "Spirit" away.

The rotoscope process on the Topas system is tedious, to say the least. There is no way to digitize in real-time, one has to do it one frame at a time. The paint package on the system is "TIPS," which is the worst paint package I have ever tried. The air brush alone will convince anyone of this fact. Combining these factors together with the "User crunch" on the system, it became apparent that some other system had to be found to rotoscope.

I needed a paint package which would have a nice air brush, and would allow me to create images by revealing one image through another. It would also need to have morphing functions, and allow me to manipulate the pallet, focus, and anti-alias functions. All of these functions existed on my Amiga computer in my DCTV and ADPro packages. Yet I needed to image back to film on the Topas system.

The solution I came up with was twisted, complicated, time consuming, yet achieved what I set out to do. The final solution had many steps and in no way is superior to the real-time systems which have been developed since the start of this thesis.

The original sequence was shot on 16mm movie film at 30 F. P. S. Movie film was used because of it's absolute frames versus video's "Fields." Eastman Color Original (E.C.O.) film, which is no longer in production, was used. This film has color properties which have never quite been duplicated by any other emulsion or computer process. Cyans and magentas have an "Other worldly" look, which matched the mood of the dream sequence I was creating.

This original film was processed and then shipped to The Tape House, Inc. to be transferred to 1" Video at 30 F. P. S. This tape was then shipped back, and put on a Sony deck capable of displaying a complete frame of video (both fields at once) and advancing and pausing one frame at a time. Each frame was then "Grabbed" using the Amiga and DCTV; each frame digitized for an agonizing ten seconds. Storing the image as a discrete file and advancing the deck brought the time up to about a minute a frame.

The images were then composited, painted, morphed, de-focused, re-colored and rippled using the Amiga. All of this, except for the morphing and the ripple were done one frame at a time, sometimes taking up to twenty minutes a frame to paint and composite. The files were then converted to an intermediate Amiga R. G. B. format. Then each image was converted into Targa 24 format and saved back over to the Topas system, using ADPro for the conversion, and Twin null modem emulator package on both the Amiga and Topas systems to send the image back to the Topas system. Each conversion took a minute, and each time an image was sent back to Topas it took a minute.

There are three distinct sections in the rotoscope. The first section starts with a still image being rippled by water, and a moving horse steps out of the image. This section sets up the "Dreamscape" by showing the image being rippled, morphing, flashing, and otherwise affected in "Dream like" fashion.

The second part of the rotoscope strips the image of some of its color while combining some hand air brushing. Some of the image is purposely blurred, yet the image isn't as grossly altered as in the previous sequence.

The third and final part of the rotoscope alters the pallet, number of colors, contrast, resolution, and exposure on a frame by frame basis. The look I was trying to achieve is that of an old film clip, complete

with light flashes, color cycling, and slow motion. I reefer to this look as the "Warm fuzzy" effect. I use it in the credits as well to add life.

5. Changes

5.1 3D Horse

The horse originally wasn't going to be portrayed as only a ghost; I wanted to make a 3D horse run and jump in a believable fashion in the barn. Although the task seemed awesome, I thought the horse could be tamed. There were several approaches I attempted to take.

The horse, I thought, could be created not as a model with pivot points in the legs (which could only approximate the muscular action of the legs), but as a cycle of 3D models, all of which together would represent a 'cycle' of a horses' canter. This kind of model building is called "Tag and replace" animation. A 'null' object is created (three points, invisible polygon) and animated over a path. Then, the computer recognizes the cycle of models which should replace the 'null' object. Even though low end systems, such as the old Amiga "Videoscape 3D" or the "Cubicomp" had these options, not even Topas 3.1 offered "Tag and replace" as an option. This method of making a horse run was impossible without a different 3D package.

The other option was to make a horse with hierarchical legs, neck, and so on. Pivot points would have to be accurately placed at the joint to mimic the horses joints. Although this kind of animation creates images which look "Puppetish," it could still create an interesting horse. This was the only way to proceed with Topas.

The next step was to find a suitable model for the horse. After talking to a carousel horse carver, I found that he uses plastic figure horses sold in toy stores made by the "Briar Horse" Company. I found a handsome model and proceeded to ponder how to digitize him into the system.

There is currently no way to "Digitize" horses or any other 3D object into Topas. There is, however, a way to digitize 2D objects. If the horse could be layered into polygons as if cut in increments, much like biologists cut paper thin layers of a rat's brain, these layers could perhaps be re-assembled in the Topas system. There is also a way to connect 2D polygons together under the Topas "Build" menu.

The problem of the plastic melting and being otherwise deformed by sawing seemed like the biggest problem. Several other problems, such as how do you register the layers together after you have disassembled them, and the ultimate destruction of the original model made me look for other methods to create topographical cross-sections of the horse.

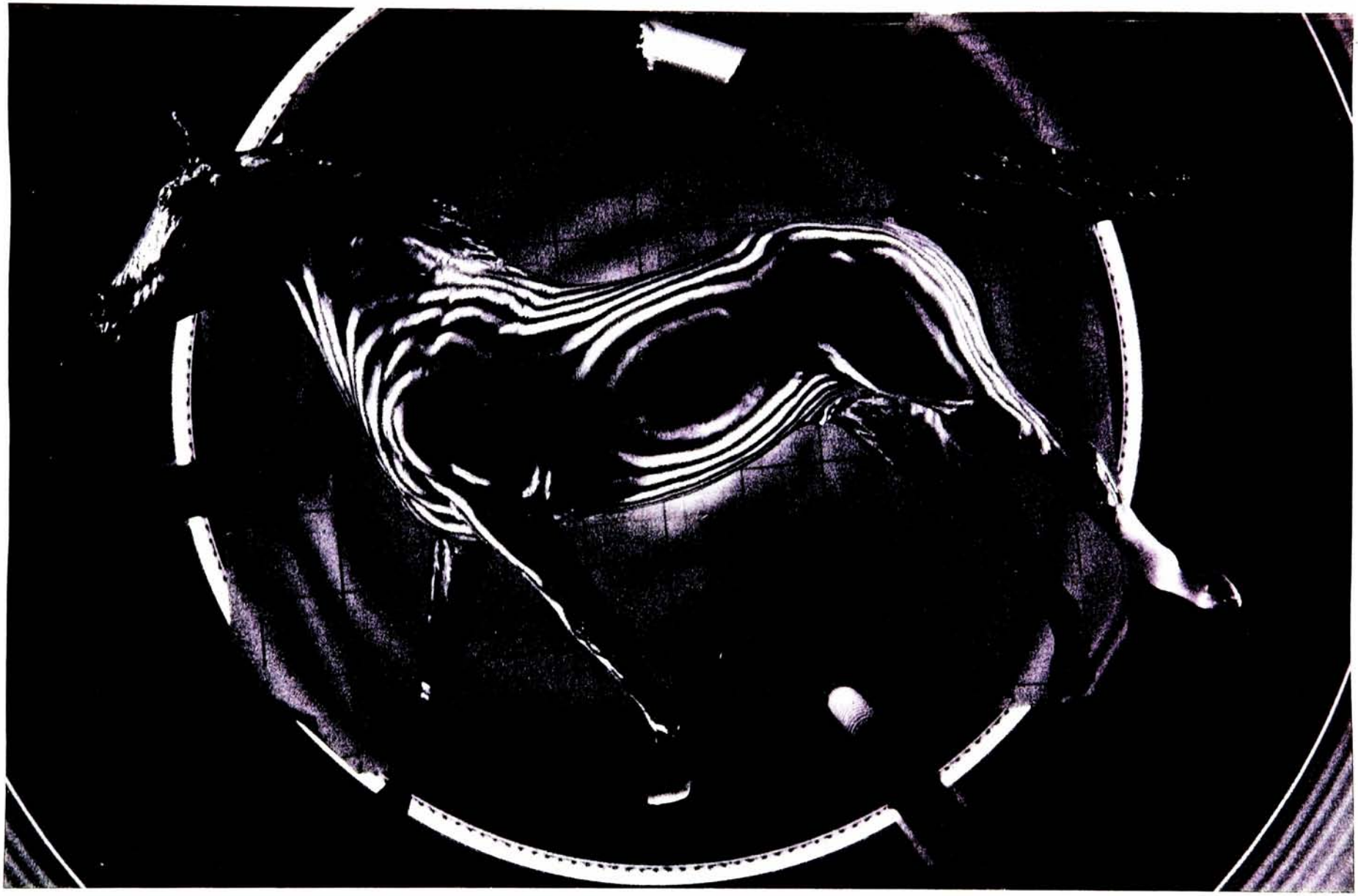


Figure 1

The logical conclusion was to create a photographic topographic 'map' of the horse model. If the horse could be traced repeatedly by a laser light which incremented every time like a saw cutting cross-sections, a camera with an open shutter should be able to discern topographic cross-sections in the exposure. I procured a laser by disassembling an old video disk player. Since the laser was large and attached to an even larger power supply, it became apparent that it would have to be fixed, and the horse would have to spin together with the camera. I mounted the horse model and 35mm camera to a turntable and made several series of exposures. When several exposures' topographical lines were traced and overlaid using tracing paper, circular polygons emerged. (Figures 1).

Unfortunately, when I started to digitize these polygons two distinct problems emerged. First, the digitizing tablet on the Topas system is not accurate and has 'noise.' In other words, if you were to take a piece of paper with a perfectly straight line on it and digitize several points into Topas, you would find that the points do not line up. Sometimes the cursor will even jump wildly and digitize points in extreme error. While zooming in on a line and straightening erroneous points is not too hard, it is impossible with an organic shapes, such as the polygons of the horse. I was relying on accuracy in Topas which does not exist, at least not in the tablet we are using at R.I.T.

The other problem encountered upon attempting to digitize a 3D horse into Topas using 2D polygons was the result of limitations of the "Connect" function found in the "Build" menu. The connect function required that all polygons have the same number of points. From the largest to the smallest, all polygons had to have the same number of points around their perimeter. The other problem with this is that the connect function automatically uses triangular connect polygons which it creates on its own. These triangular polygon connected models had strange render attributes and did not reflect light in any predictable manner. Upon investigating, it seemed that the surface normals of the triangular connect polygons needed to be edited on an individual basis, an astronomical task of no certainty. Between all these limitations I decided to re-think my script and story and concentrate on what seemed to be working.

The barn and forest had achieved what I wanted them to; they portrayed a place which seemed almost real. If I placed models of a horse, rider and trainer which looked less real than the barn and forest, I would be detracting from my accomplishments. It would have been laughable to see

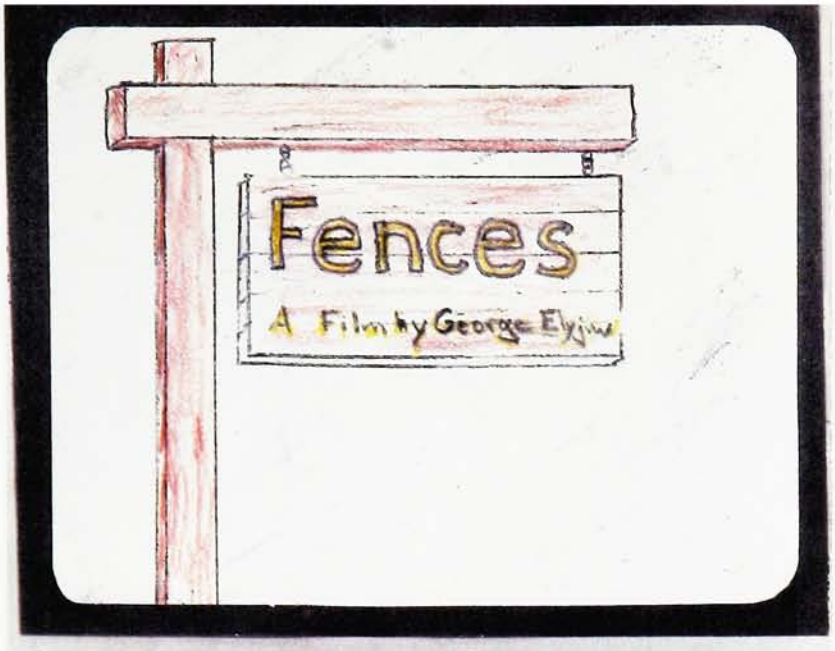
a stick-figure-ish or puppet looking horse running in the barn I built. There were no easy answers.

5.2 Narration

Narration was added latter because it was needed to tell the story. Since the horse did not exist, it's ghost needed introduction. The narration also helped create the "Establishing Shot" and "Set-up" the story. Although it wasn't in the original story board, its addition was beneficial to the animation.

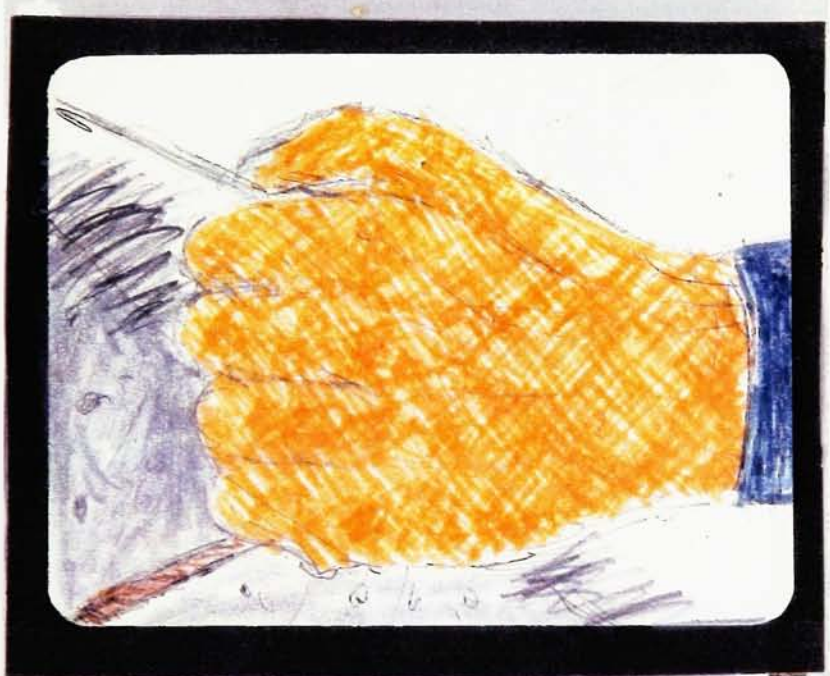
It dawned on me that the horse I was so moved by, whose passing I mourned so, only existed as a ghost in my mind. So did the time which I spent time at the stables with "Andrea." All that was left were memories, memories which would re-awaken with every trip to the stables and the big indoor polo ring (or "Barn"). Instead of having the characters appear on-screen, why couldn't just the voices of the past hang in the Barn after everyone had departed? Isn't that what moved me so to write the short story-- a person and a horse I would never see again. By portraying them as ghosts, and including the thoughts of a ghost rider, I could truly show the loneliness of the rider, and how empty the barn was *without* everyone.

A few tests with a narrator over some of the footage of the barn convinced me that this was the only way to proceed and still create the feeling of another believable world, a very lonely one at that. There would be no horse, no rider, no trainer; their actions of years ago were immortalized in the barn itself, and in the sounds it makes.



Fences

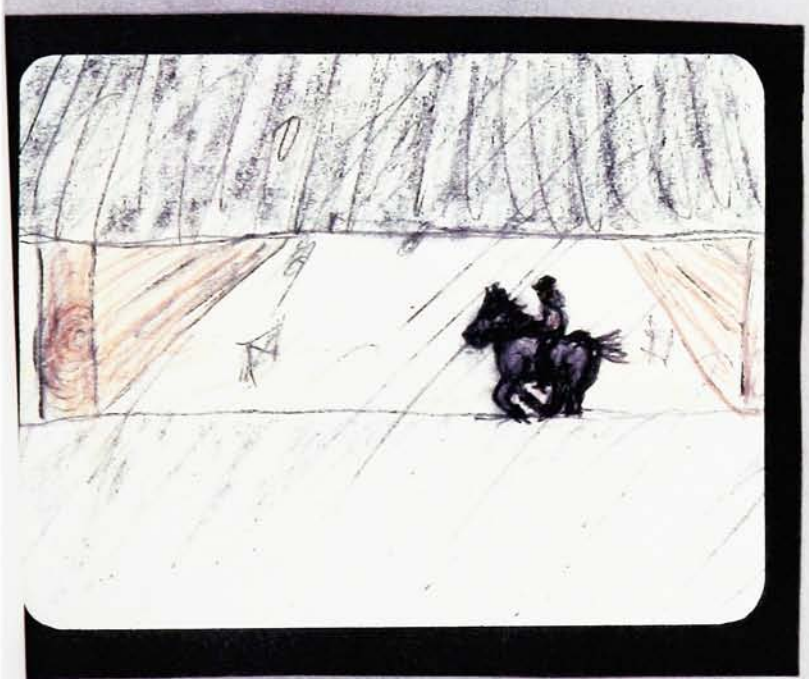
George Elyjiw



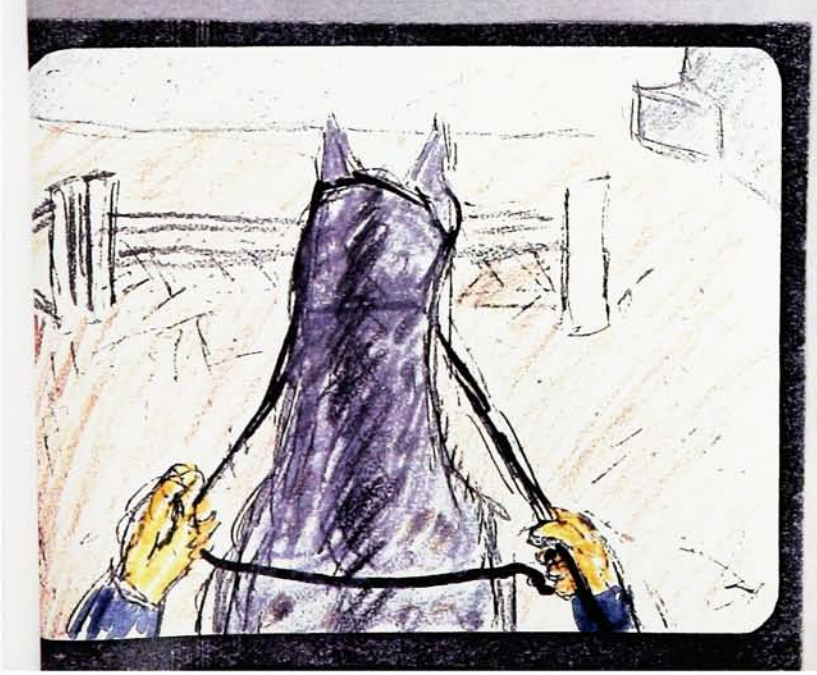
We turn the corner cantering too fast, I try to half-halt.

The gate is upon us as I press my legs against the horse's sides...

Press-release, sitting back up shoulders first, all while looking at the next gate.

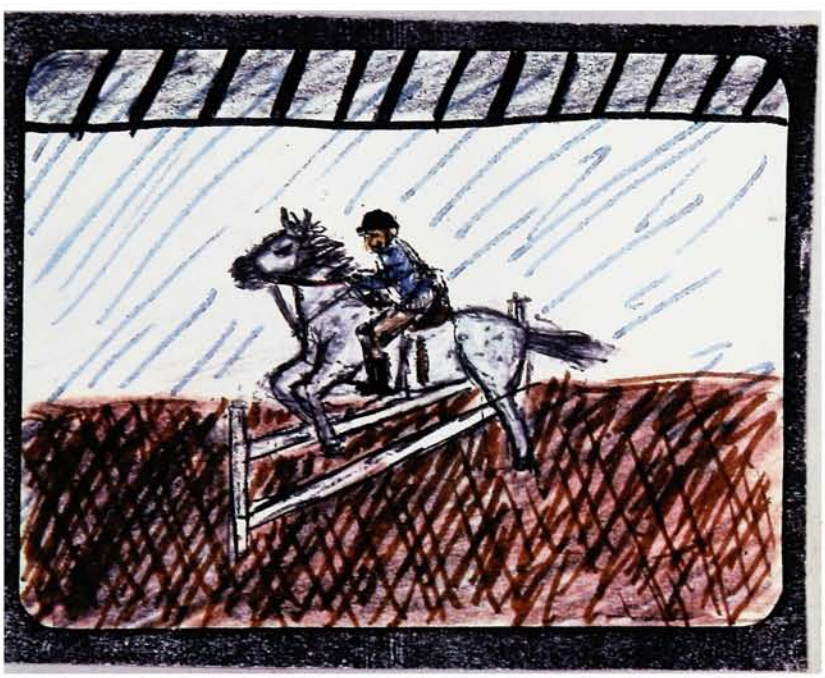


The rain on the tin roof (of the arena) is deafening and soothing, like the sound of a thousand hands clapping.



It has wiped all thoughts from my mind except the next gate comming up and the pace of the gallop.

Together, we go over the gate, my legs closed tightly around him, my chest nearly touching his neck.



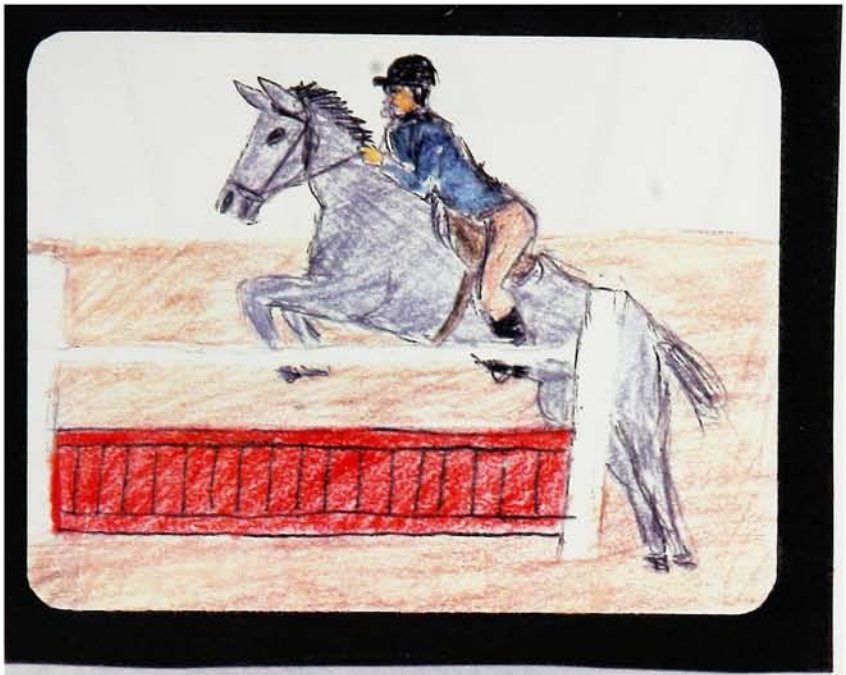
Together, we take the gate. We hang in the air just long enough for me to believe we are flying.

My muscles against his is what drives both of us to the next gate;

now we are flying, we are the wind again.

I hear nothing but the roar of the rain and wind

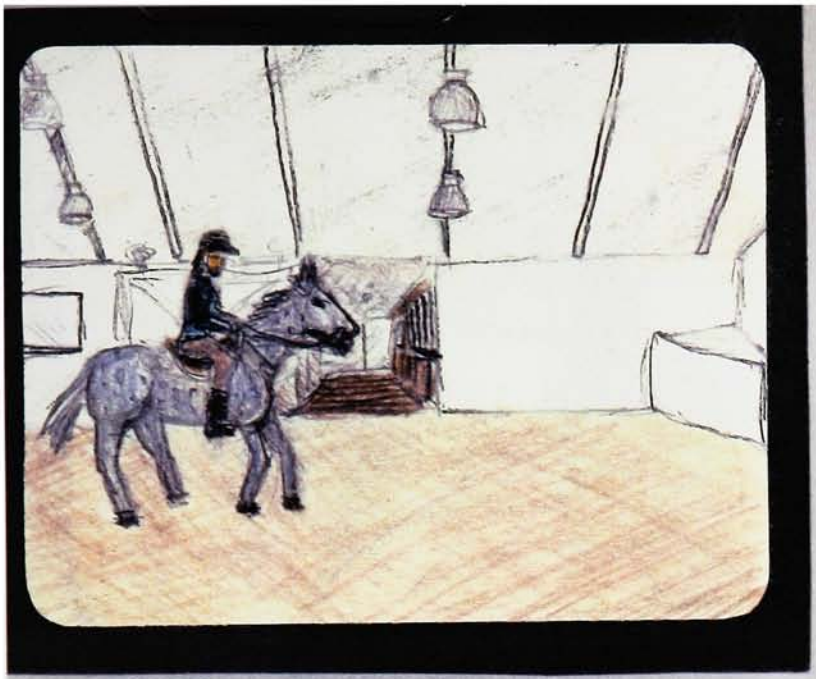
and Now the yells of the trainer. She is screaming at the top of her lungs and I don't know why.



I can't hear her. We are taking the fences and I feel my form has been good.

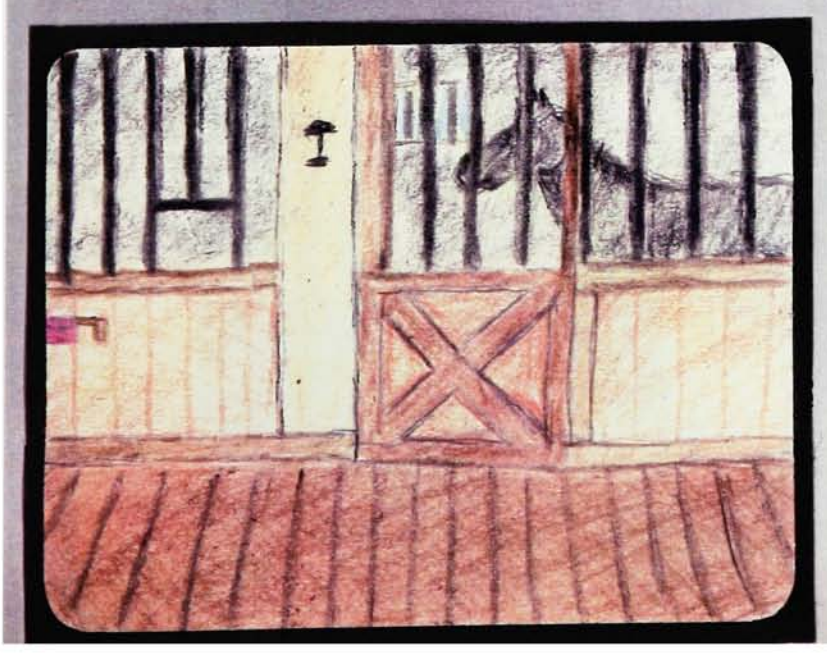
"Wrong course!"

She must have been yelling at me the whole time -- I've been taking the wrong course and haven't even noticed.

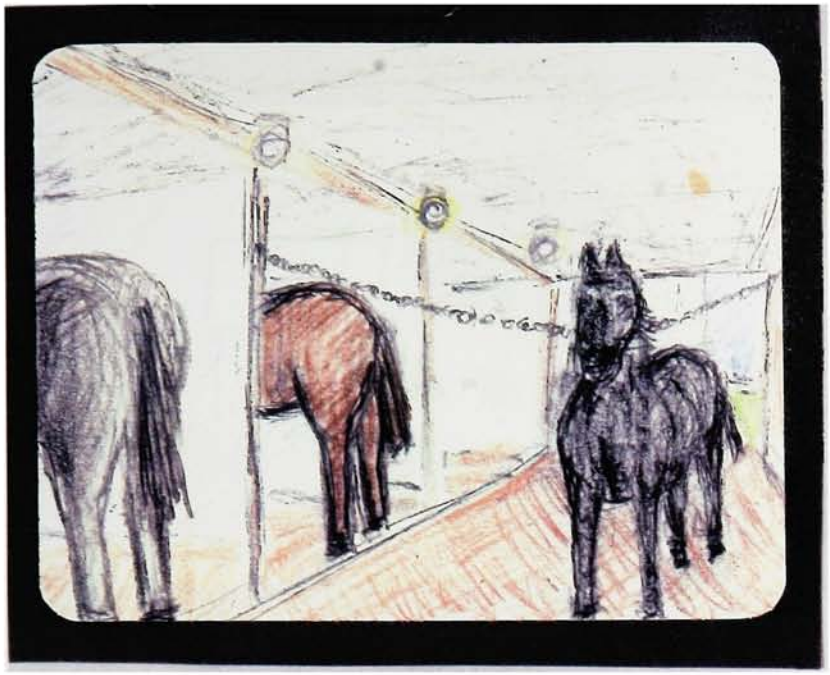


"Pat the horse - he looked great."

I guess I sill have her on my mind. Andrea. I thought I blocked that part of my life out completely, yet sometimes I remember her.



She first took me into the stables and showed me her horses. I will never forget being dwarfed by these magnificent beasts.



Walking around a thoroughbred on cross-ties made me feel a little tense.

She turned her horses out in the paddock and cracked the whip to make them run.

I wathced her as much as I watched the horses as she saddled up and jumped fences.

She kidded with me that when fall came she wouldn't stick around. I knew that she was moving away.

Then her world began closing in on her.

She just spent more and more time at the stables.

The horses were her only escape, they were the only thing that seemed to matter to her.

I wonder what she saw, what she felt when she jumped fences.

Andrea, if we just hadn't kissed that night we would still be friends.

Fade to black.

Then it was my world which came appart. Some things are beond control.

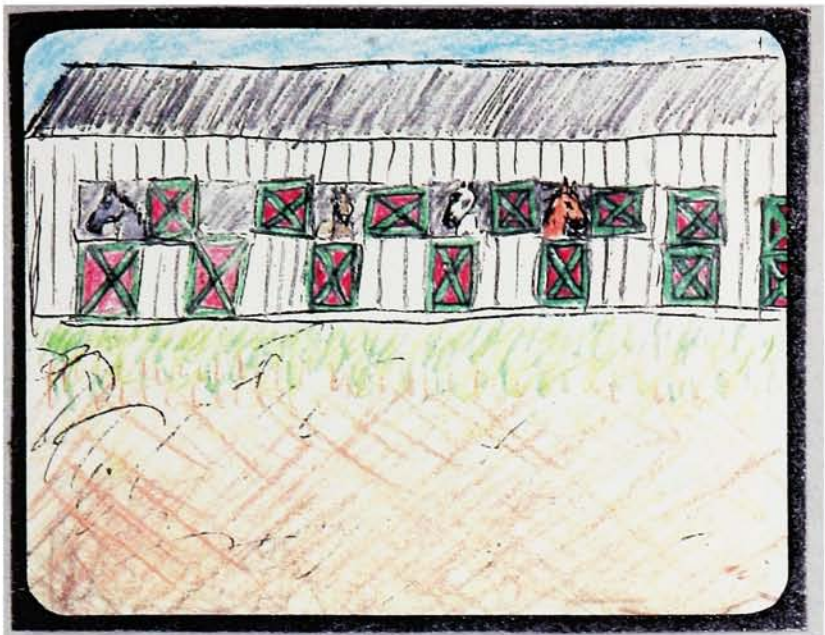
(Horse rears. "Ho, Boy, Ho!").

I really needed you then, Andrea, I really needed a friend.

But the fall had come and you were gone.

I don't know why you ment so much to me.

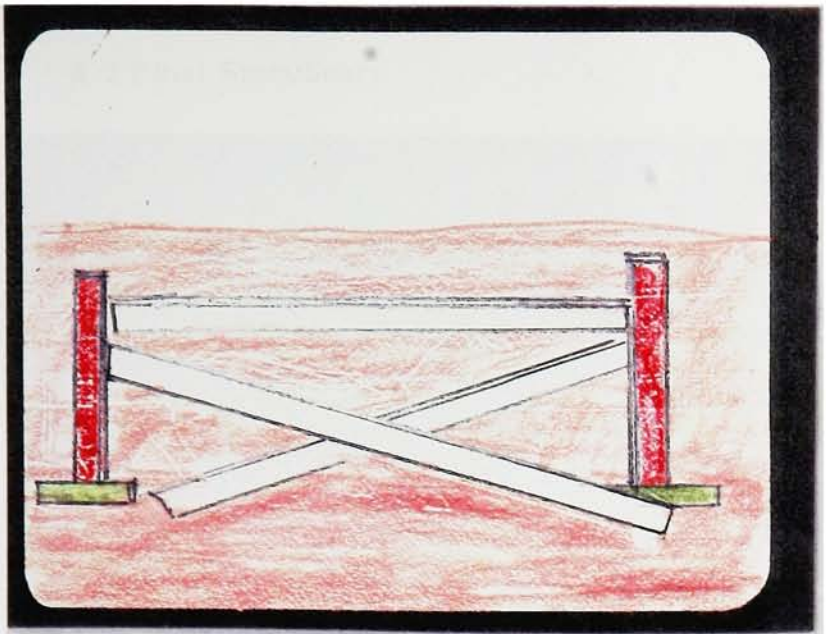
I went in the mornings and watched them turn the horses out.



The horses were the only thing that brought me peace.

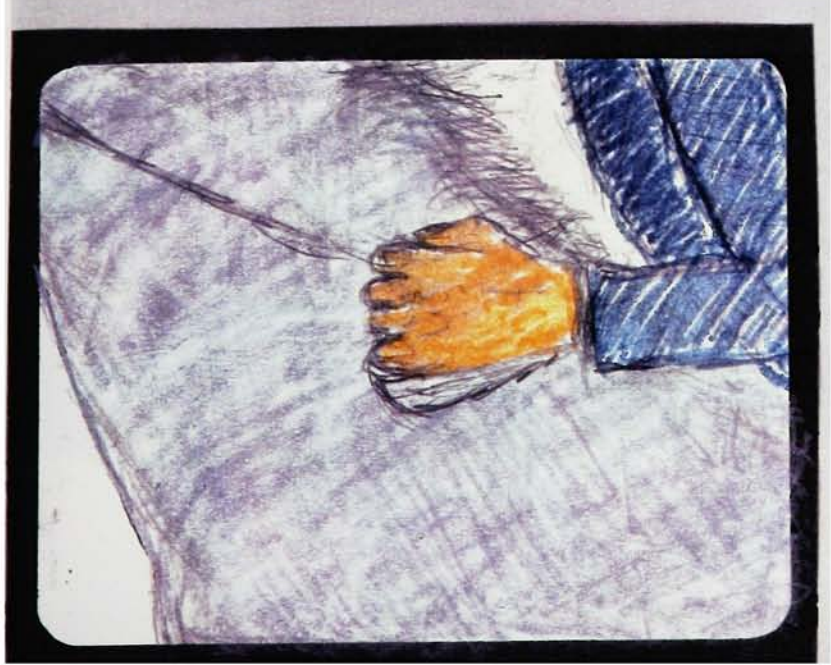
Since that time I have learned to ride and jump. It is not that I want to be better than her.

It has absolutely nothing to do with Andrea anymore. I love the horses.



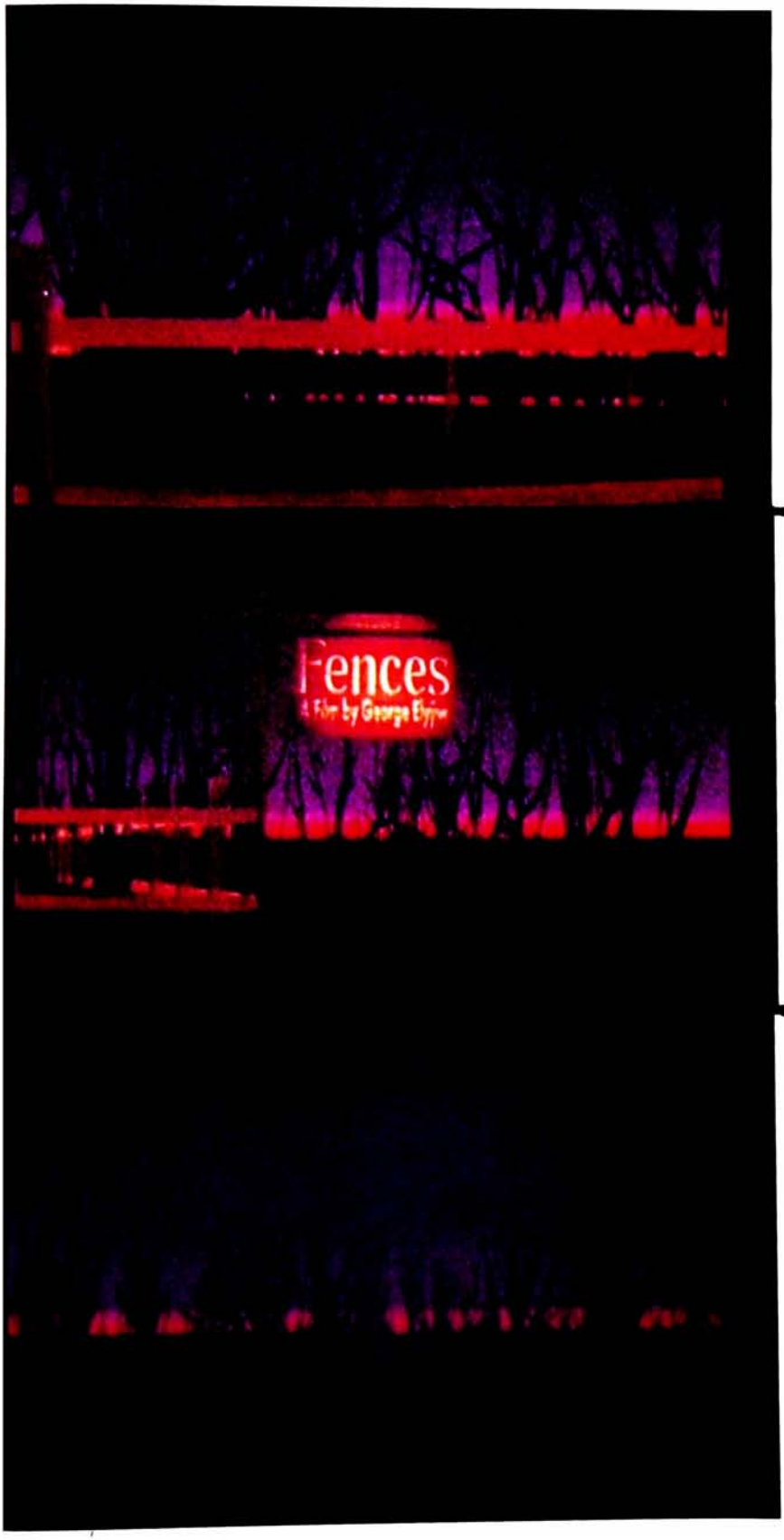
"Keep your mind on the course."

We turn the corner cantering just right as I press my legs against the horses sides...



and tuck down close to his neck. I think only of the horse's pace and the next gate as we fly like the wind.

6.2 Final Storyboard

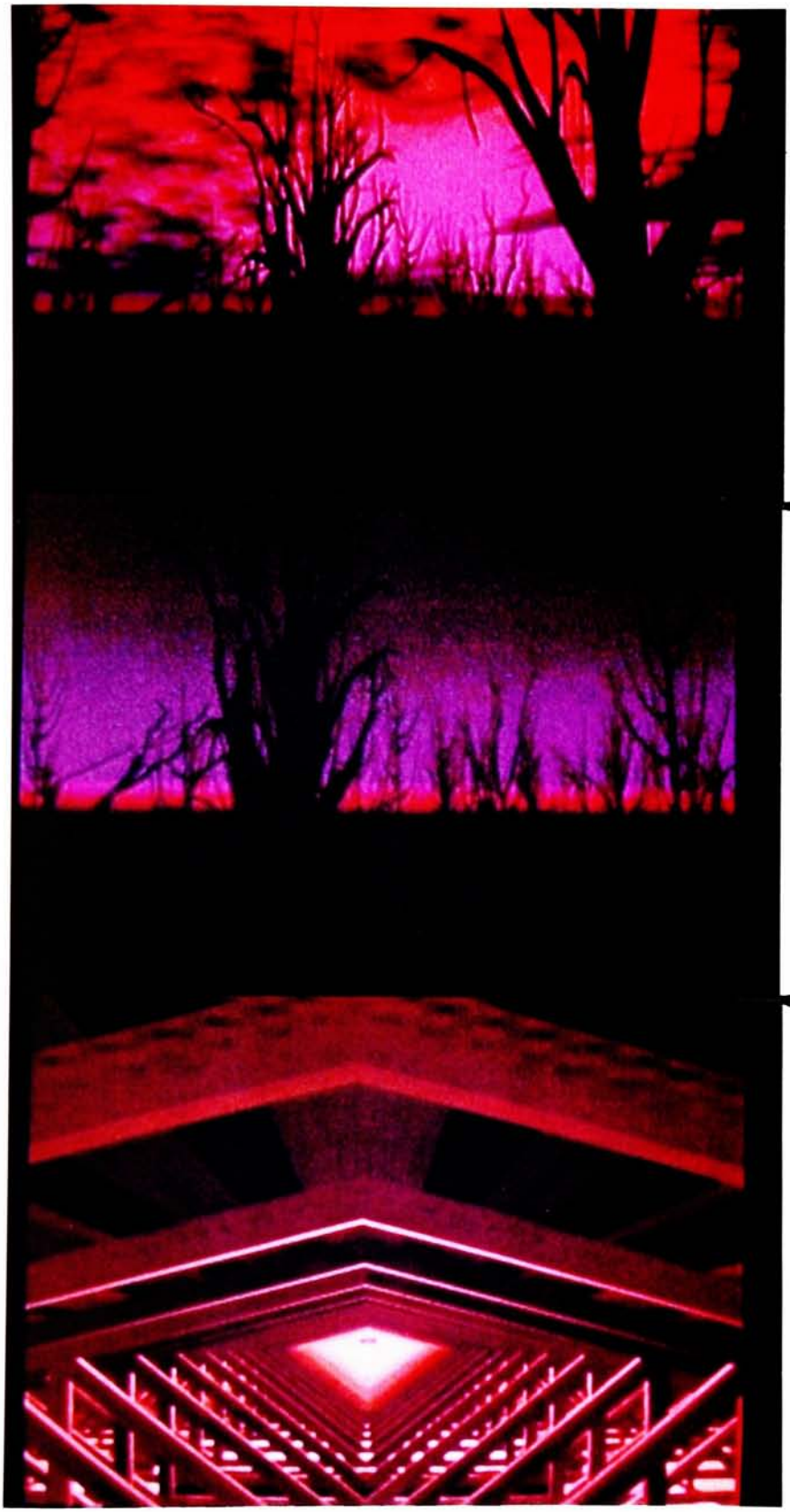


Fences of wood and nails
straight rails

Boundaries marked in
Earth and mind

Keep us from wandering
through untold forsets

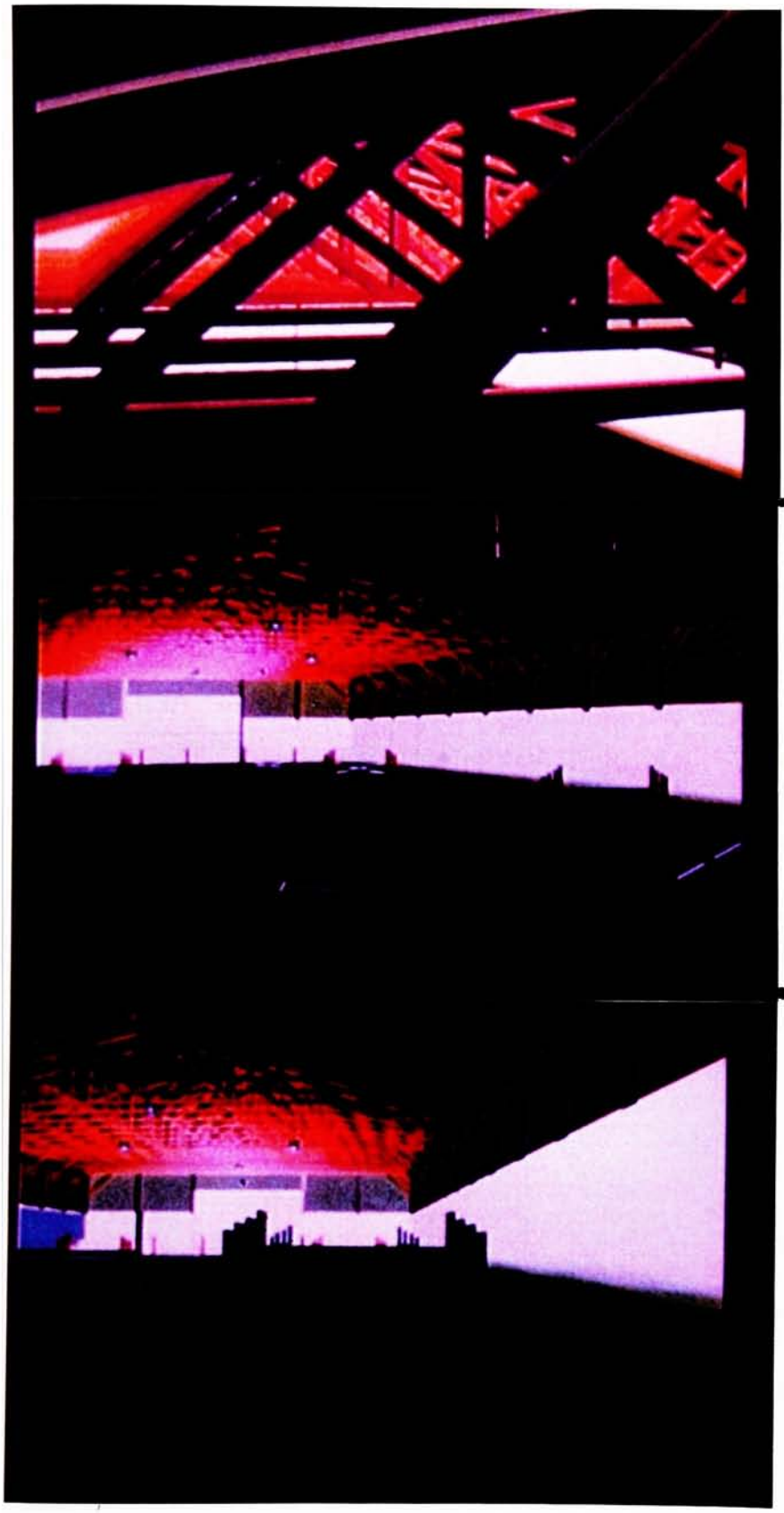
Keep us from straying
over boundaries built
long ago.



(Thunder)

(A horse is heard in the distance)

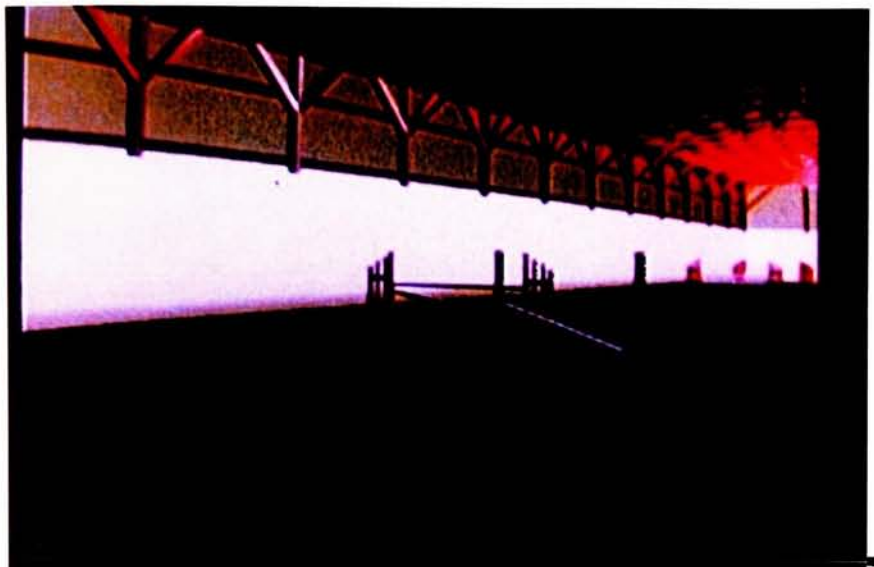
In one such forest, in one such barn, when the night is darker than usual



The rumble of thunder just right. You could swear you can see the fences.

You could swear you can hear horse hooves.

We turn the corner trotting. The gate is upon us as I press my legs against the horses sides.

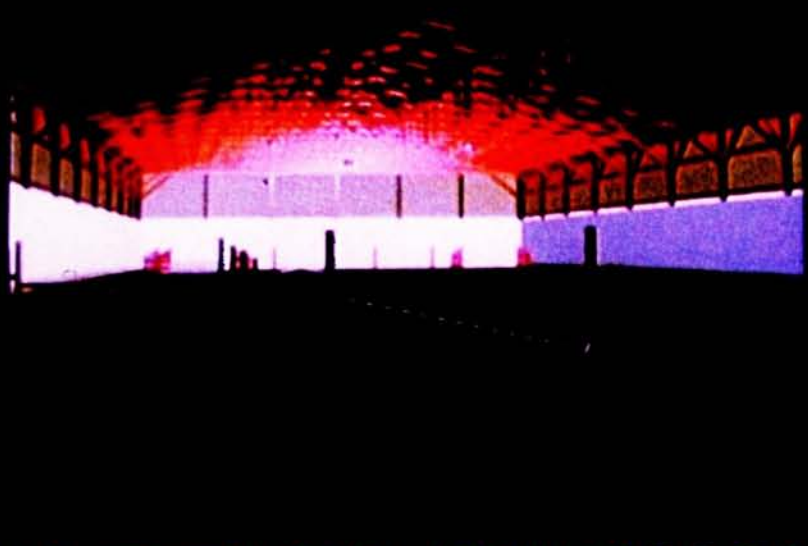


Press-release, sitting back
up shoulders first, all while
looking at the next gate.

(Trainer yells "More leg!")

(Trainer yells "Diagonal!")

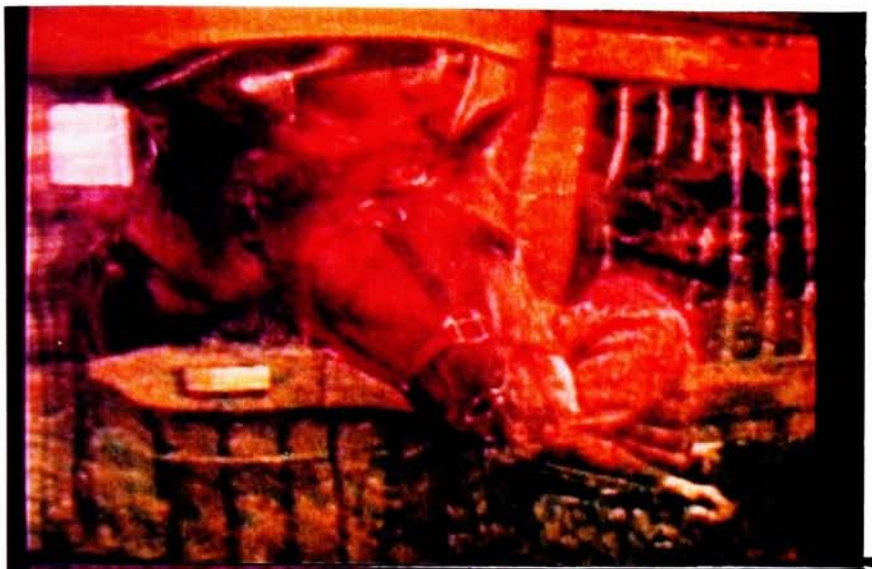
(Trainer yells "Wrong course!")



The rain on the tin roof is
deafening and soothing, like
the sound of a thousand hands
clapping. Together we go over
the gate, my legs closed tightly
around him, my chest nearly
touching his neck. Now we are
flying, we are the wind again
I hear nothing but the roar of
thunder and yelling.

(Trainer yells "Where are going?
What are you thinking?")

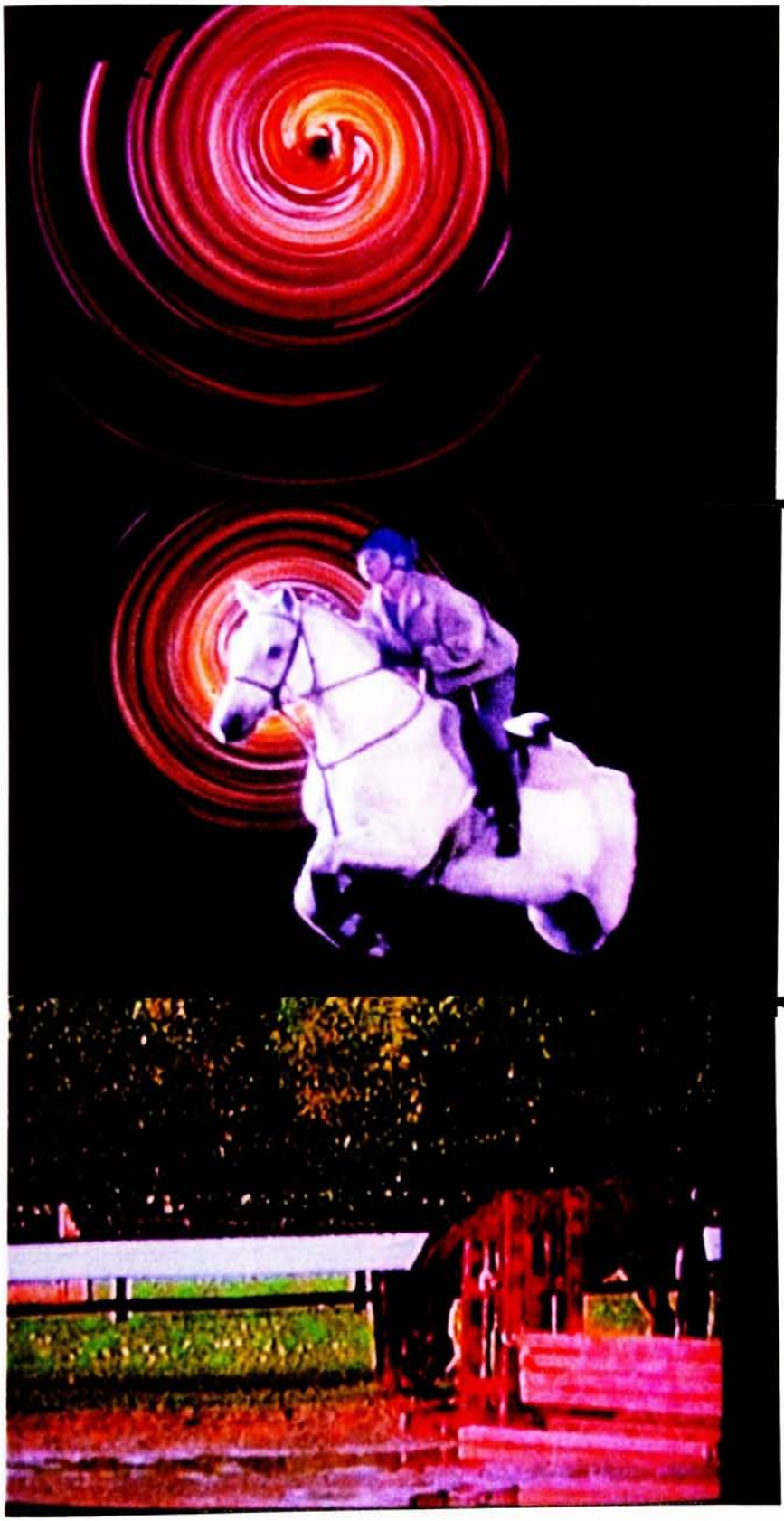
I still have her on my mind.
Andrea, I thought I blocked
out that part of my life completely,
yet I still remember her.



She first took me into the stables and showed me her horses. I will never forget being dwarfed by these magnificent beasts.

Walking around a thouroughbred on cross-ties made me feel a little tense.

She turned her horses out in the paddock and cracked the whip to make them run.



I watched her as much as I watched the horses as she saddled up and jumped fences.

She kidded with me that when fall came she wouldn't stick around.

I knew she was moving away.

Then her world began closing in on her.

She just spent more and more time at the stables.

The horses were her only escape, they were the only thing that seemed to matter to her.

I wondered what she saw, what she felt when she jumped fences.

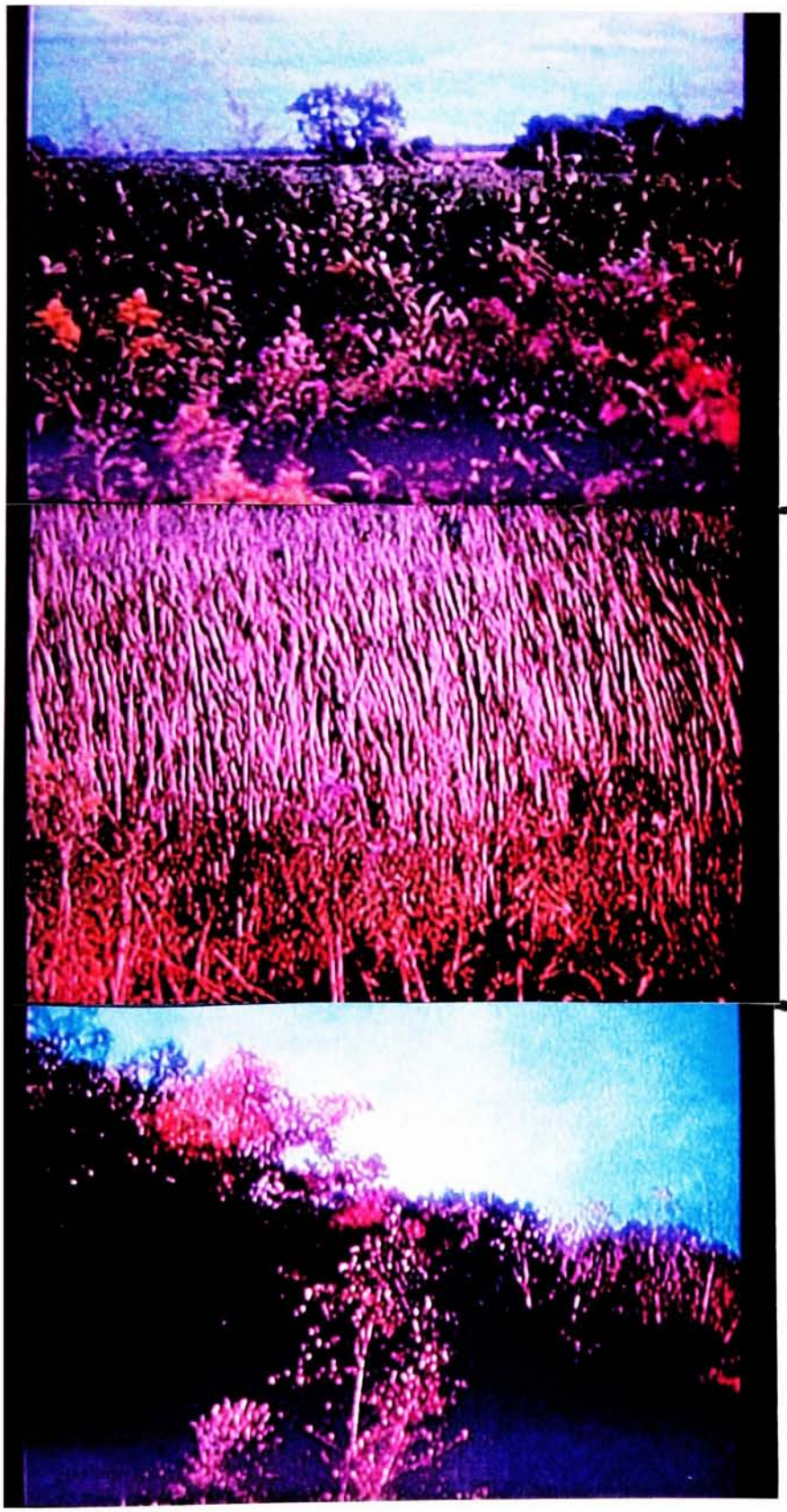
Andrea, if we just hadn't kissed that night...

we would still be friends.

Then it was my world which fell apart.

Spirit was gone.

I went in the mornings...

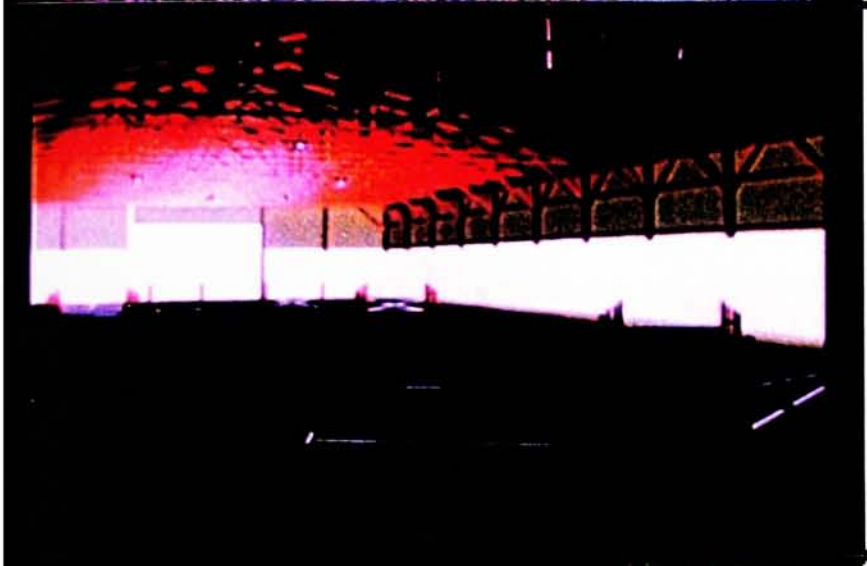


...and watched them turn the horses out.

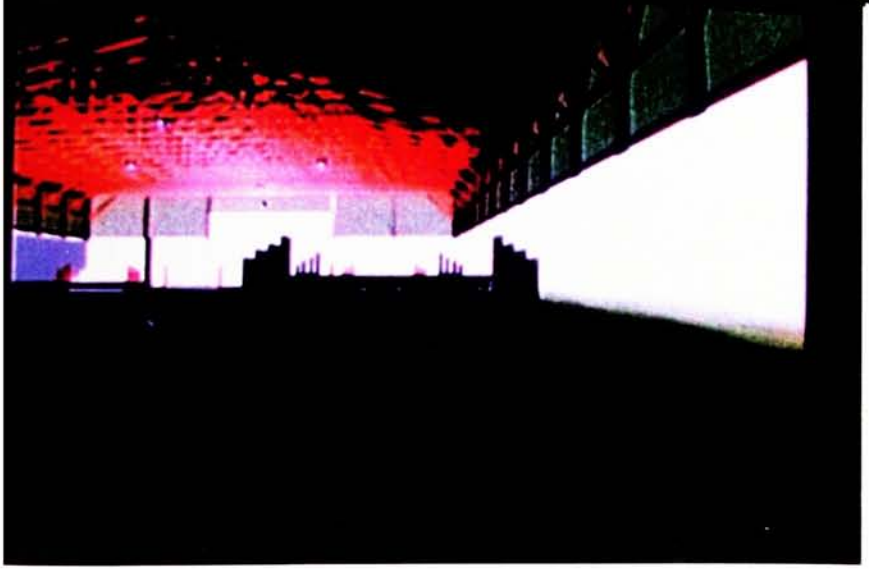
The hoses were the only thing...

which brought me peace.

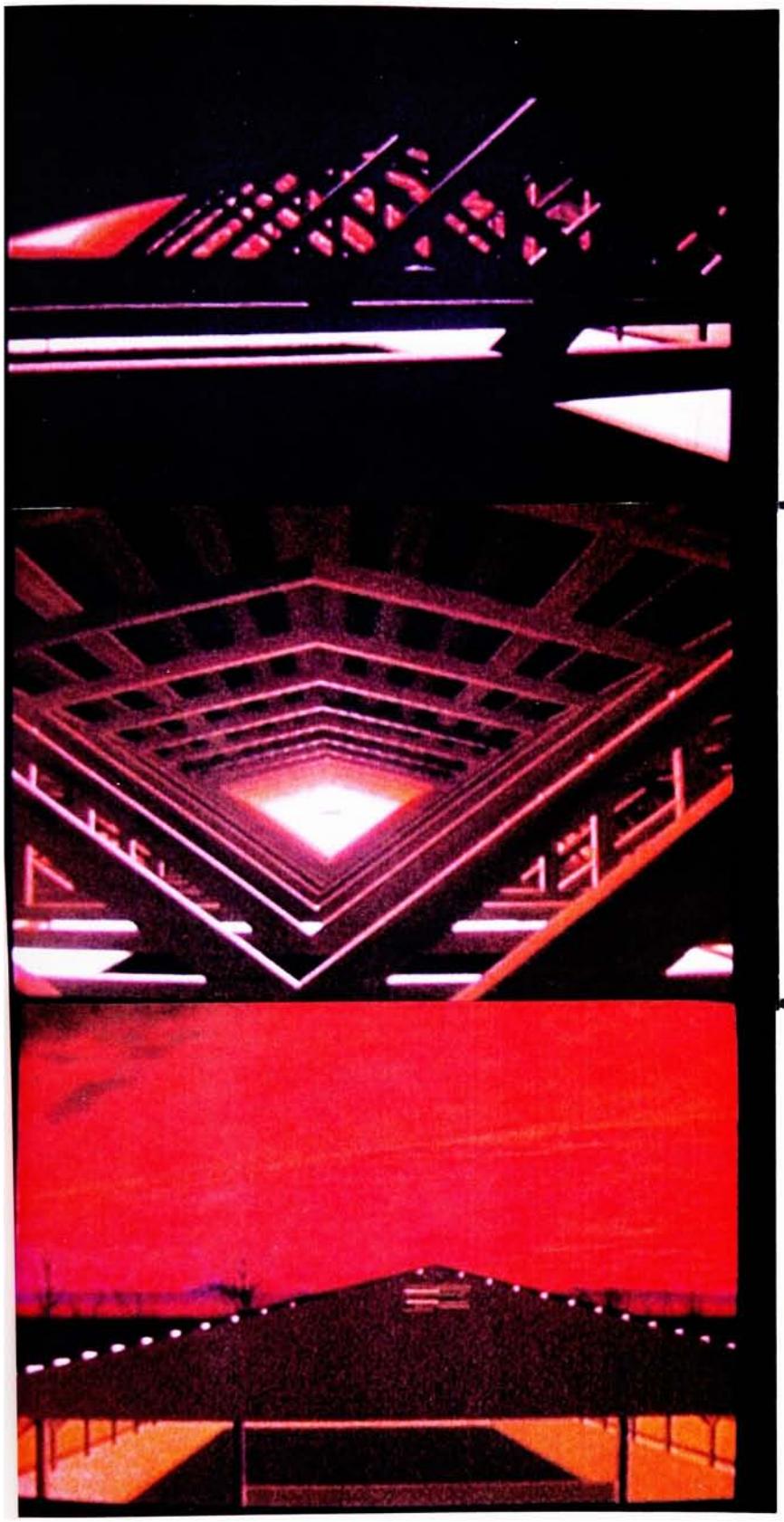
Since then...



...I have learned to ride



and jump. It has nothing to do with Andrea anymore.



We turn the corner cantering just right as I press my legs against the horses sides and tuck next to his neck. I can only think of the horses pace as we fly like the wind.

One such night...

came and went...

and the spirit never returned.
Finally, at rest, we fear no more
the phantom fences of the forest
barn.

Bibliography

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